

# *Recycling of Non-ferrous Metals in India*

## *- An Update*



JOINT  
STUDY GROUP'S  
SEMINAR  
Lisbon  
4-6 Oct 2023



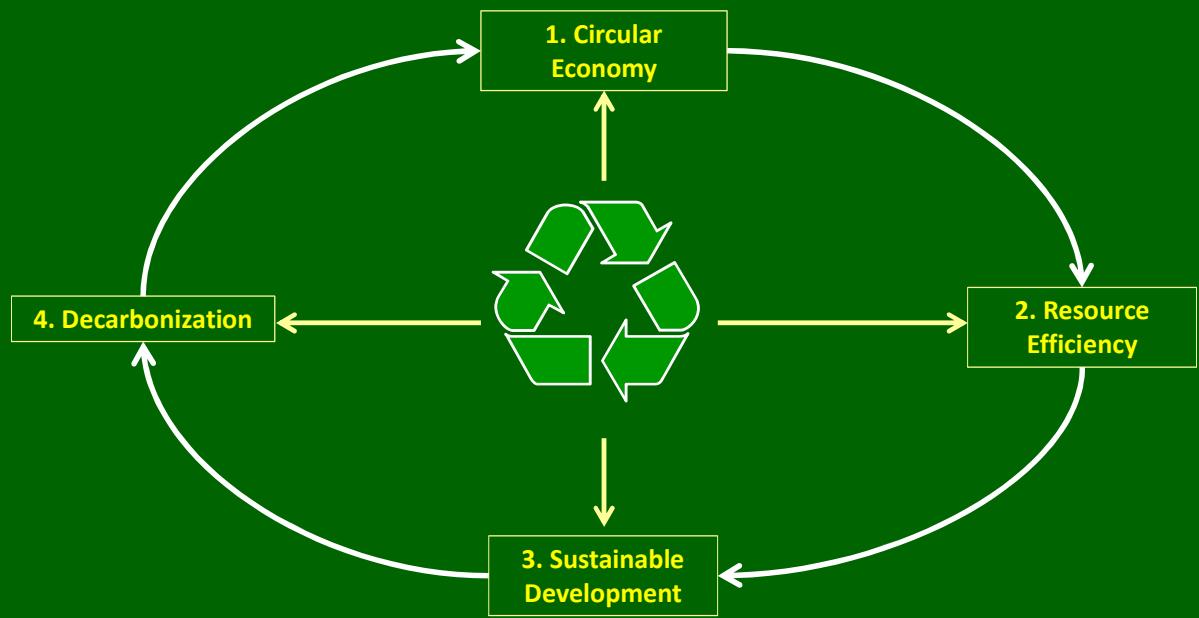
*L Pugazhenthy, Executive Director  
India Lead Zinc Development Association &  
Past President, The Indian Institute of Metals*

### *Types of Wastes Increasing*

- *Kitchen wastes*
- *Municipal wastes*
- *Agricultural wastes*
- *Industrial wastes*
- *Electronic wastes*
- *Plastic wastes*
- *Construction & Demolition wastes*
- *Bio-medical wastes*
- *Hazardous wastes*
- *Nuclear wastes .....*



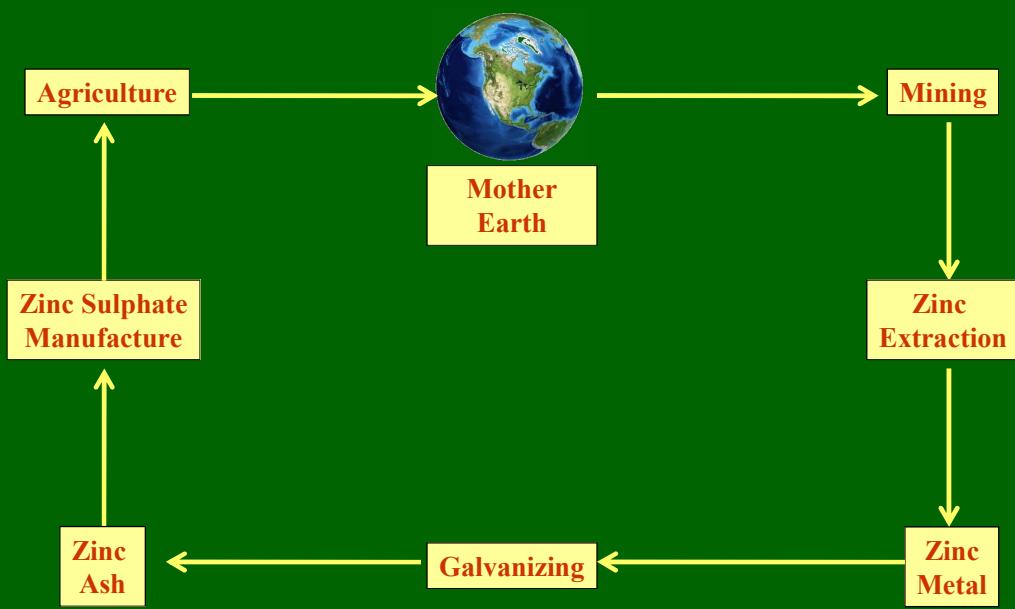
# Why Recycling is Inevitable?



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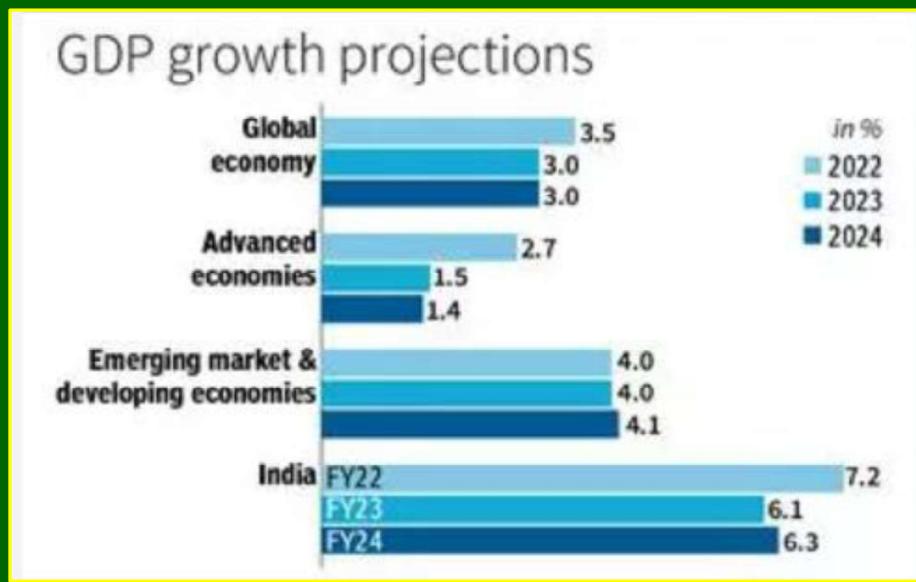
## ZINC ASH

### Ideal Example for Circular Economy



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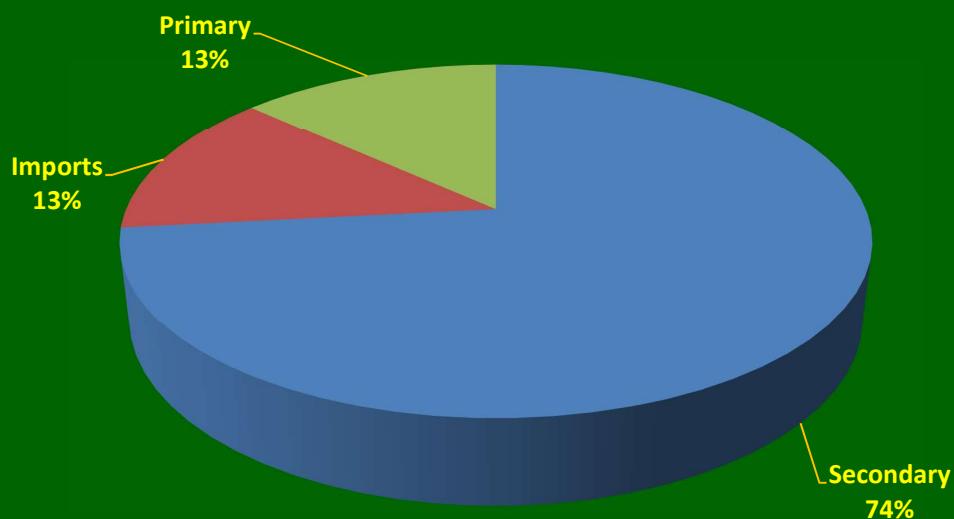
# IMF GDP Growth Projections



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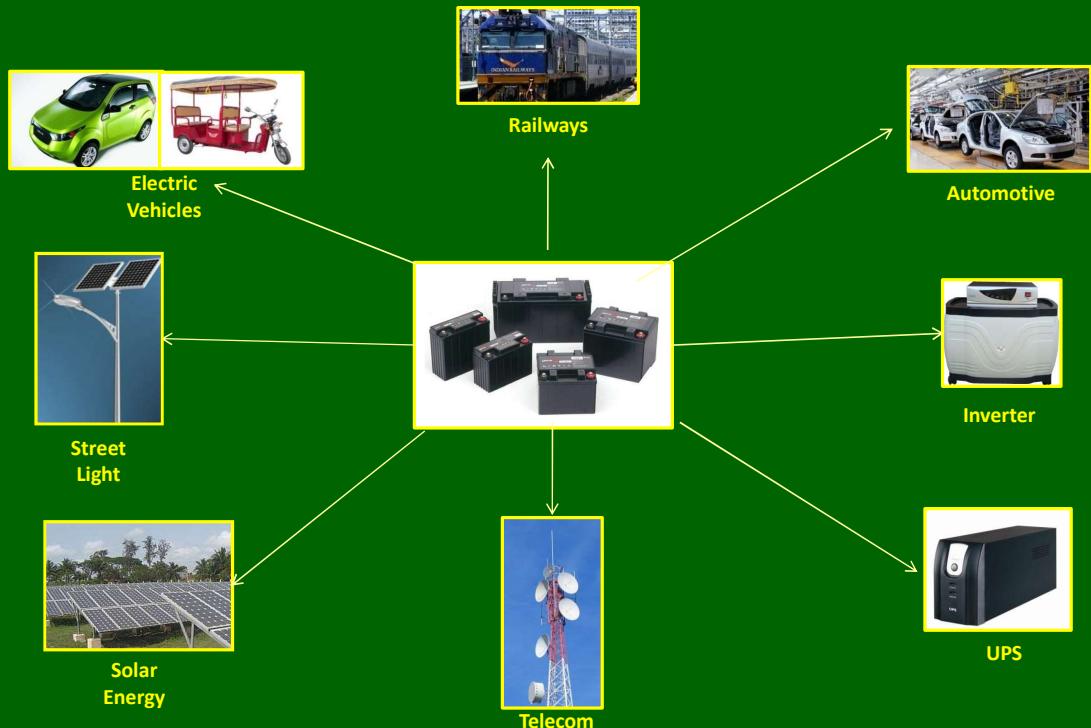
## 1. LEAD IN INDIA

### Secondary Lead Share



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## Lead Battery – Touches Our Daily Lives



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## INDIAN LEAD INDUSTRY

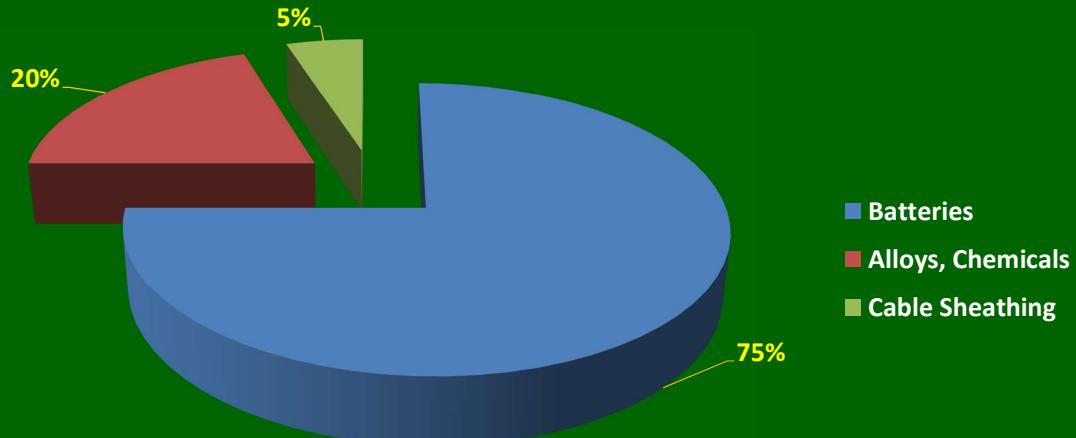
(million tonnes)

|                                  |                           |
|----------------------------------|---------------------------|
| <b>Total Lead Consumption</b>    | <b>: 1.50 (Estimated)</b> |
| <b>Secondary Lead Production</b> | <b>: 1.10 (Estimated)</b> |
| <b>Primary Lead Prodn</b>        | <b>: 0.20</b>             |
| <b>Lead Imports</b>              | <b>: 0.20</b>             |

|   |               |
|---|---------------|
| <b>Authorized Recycling Capacity (2022)</b> | <b>: 3.50</b> |
| <b>No. of Authorized Units</b>              | <b>: 625</b>  |

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## *End Uses of Lead*



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## *Renewable Energy Mission*

Target by 2022: 175 GW



**Target By 2030: 450 GW**



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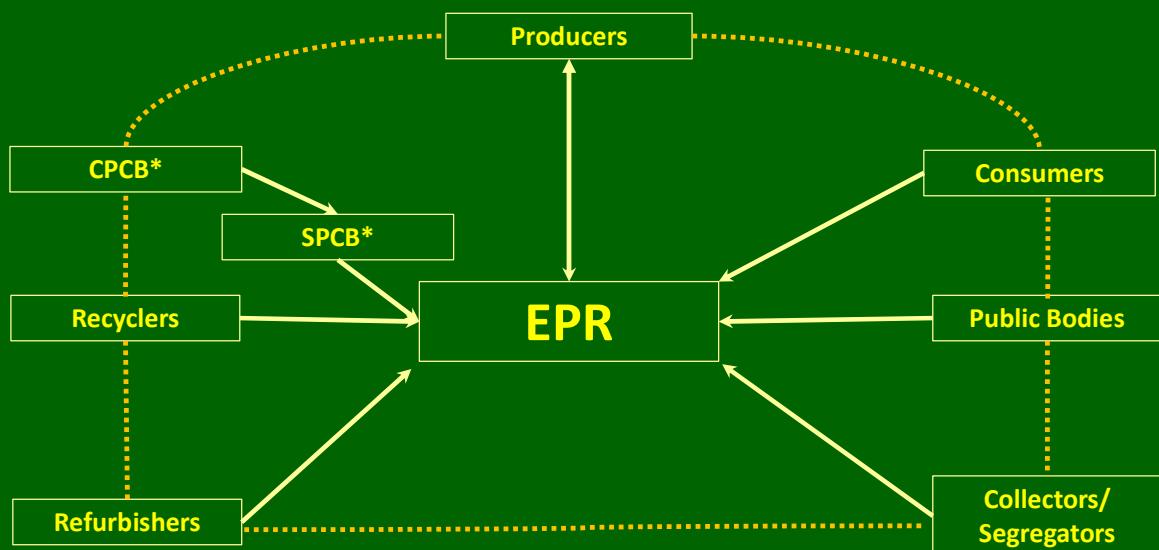
# INDIA'S ELECTRIC MOBILITY MISSION (FAME\*)



\*Faster Adoption & Manufacture of Electric vehicles

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## *Battery Waste Management Rules-2022 EPR & Multi Stakeholder Responsibilities*



\*CPCB – Central Pollution Control Boards

\*SPCB – State Pollution Control Board

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## 2. ZINC IN INDIA

### *Primary Production (tonnes)*

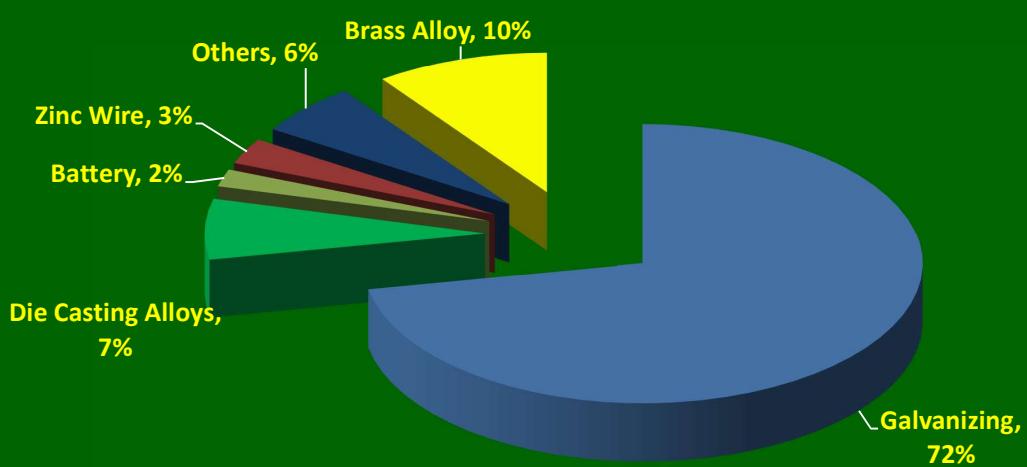
| Year      | Production |
|-----------|------------|
| 2019-2020 | 688000     |
| 2020-2021 | 715000     |
| 2021-2022 | 776000     |
| 2022-2023 | 821000     |



(Source: HZL)

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### *Sectoral Zinc Consumption*



(Source: HZL)

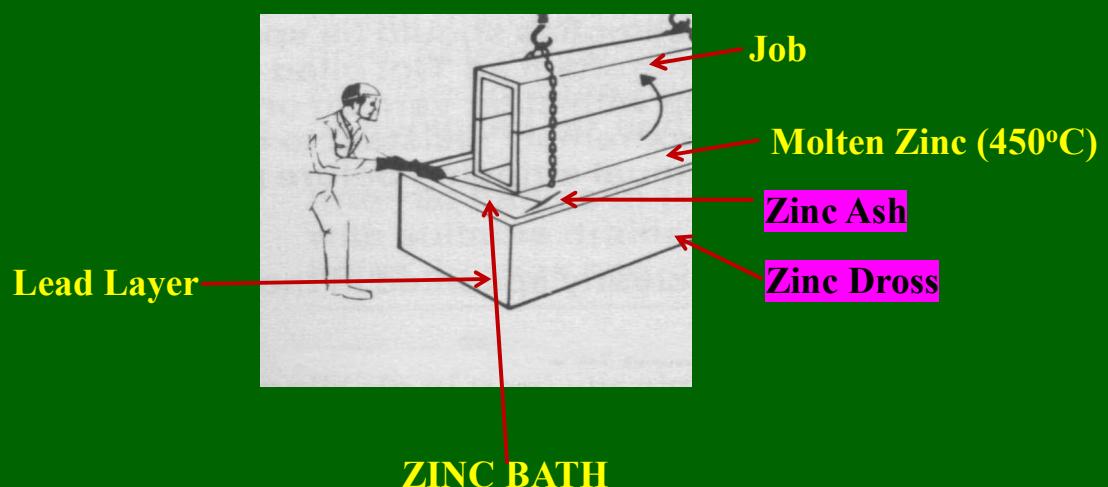
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## *Hot Dip Galvanizing*



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## *Formation of Zinc Wastes*



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## Zinc Dross

- Steel (article) – Zinc reaction
- Free Iron & Iron Salts – Zinc reaction
- Steel (kettle) – Zinc reaction
- An Iron-Zinc Intermetallic Compound,  $\text{FeZn}_{13}$
- Approx 94% Zinc & 6% Iron



- Raw Material for Manufacture of Zinc Oxide
- Zinc Oxide used in Rubber, Tyre, Paints, Pigments etc.,

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## Zinc Ash

- Surface oxidation of molten Zinc

### Zinc Ash – Typical Composition

|           |          |
|-----------|----------|
| Zinc      | 50 – 75% |
| Lead      | 2 – 10%  |
| Iron      | 1 – 6%   |
| Aluminium | 0 – 5%   |
| Copper    | 0 – 5%   |
| Chlorides | 4 – 10%  |

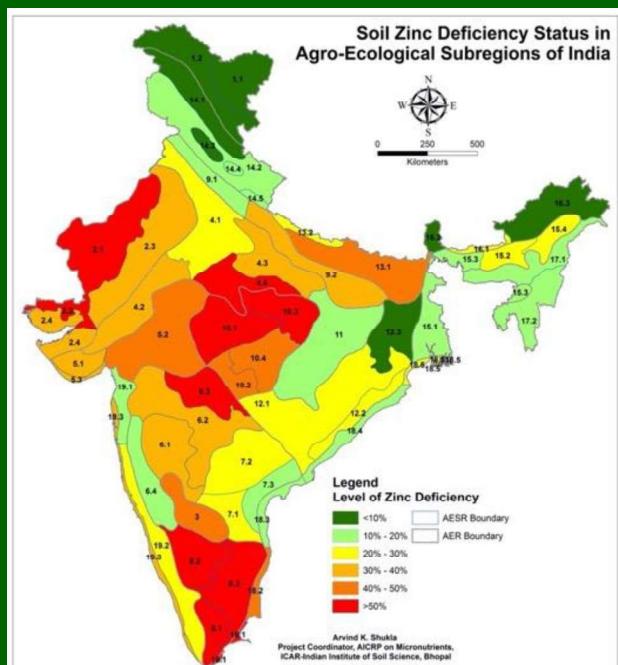


- Raw Material for Manufacture of Zinc Sulphate, used in Agriculture as a Micronutrient

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# Extent of Zinc Deficiency in India

*About 40% of Indian soils are Zn deficient*

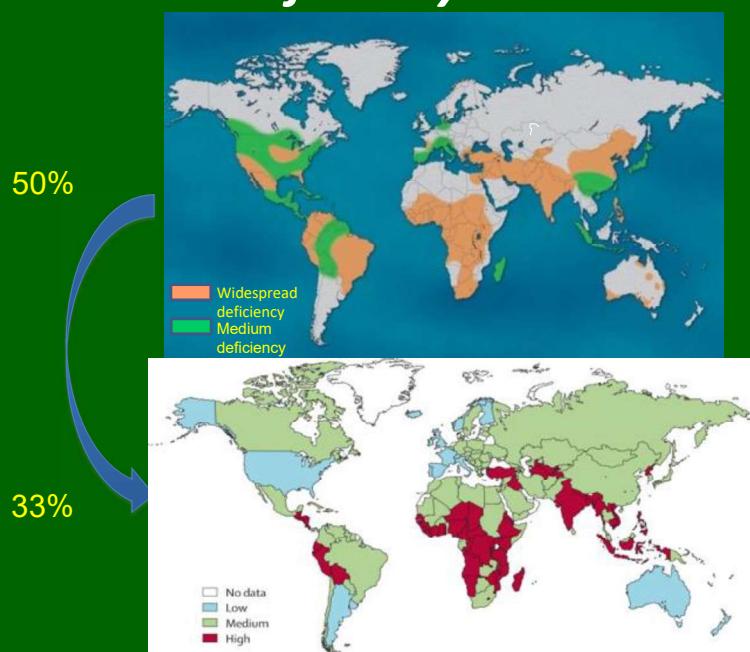


(Source: IZA)

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## Zinc Deficiency in Soil **Influences**

### Zinc Deficiency in Humans



Soils

Humans

B.J. Alloway (2008) (Courtesy: IZA)

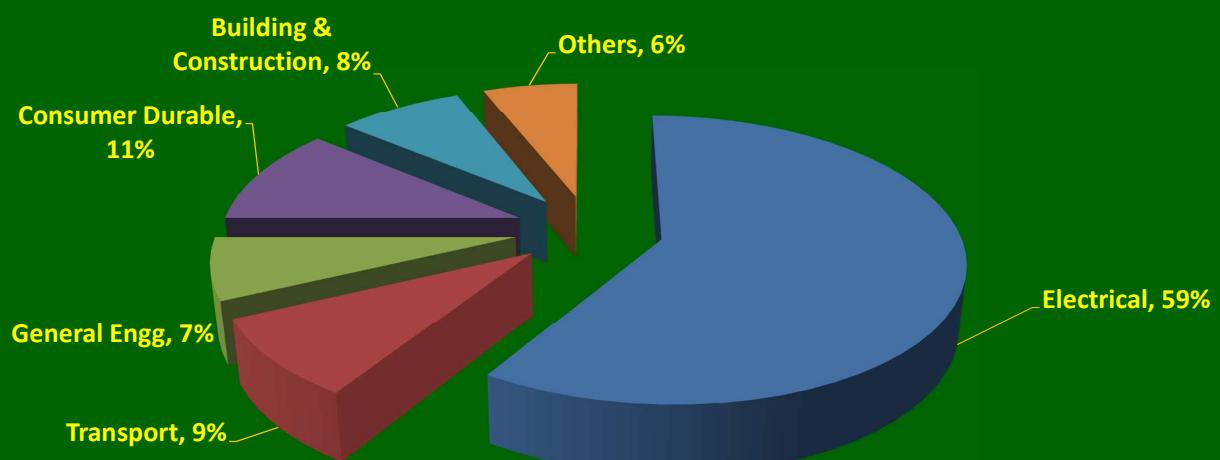
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### 3. COPPER IN INDIA (tonnes)

|            | 2020-2021 | 2021-2022 | 2022-2023 |
|------------|-----------|-----------|-----------|
| Production | 363,600   | 484,600   | 555,000   |
| Import     | 150,200   | 134,100   | 175,700   |
| Export     | 46,300    | 75,500    | 10,000    |
| Usage      | 467,500   | 543,200   | 720,700   |

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### *Sector-wise Copper Usage in India*



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# *Copper Scrap Imports & Domestic Availability (in tonnes)*

| <b>Imports</b> |                                 | <u>2021-2022</u> | <u>2022-2023</u>    |
|----------------|---------------------------------|------------------|---------------------|
| 1.             | <b>Copper Scrap &amp; Waste</b> | <b>115222</b>    | <b>133789</b>       |
| 2.             | <b>Copper Alloy Scrap</b>       | <b>86570</b>     | <b>87607</b>        |
| 3.             | <b>Domestic Availability</b>    |                  | <b>250000 (est)</b> |

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## *Types of Scrap & Usage*

- *Process Scrap*
- *End of Life Scrap*

*Usage*

- *In Primary Production*
- *Direct Melting*
- *Secondary Tried & Closed*



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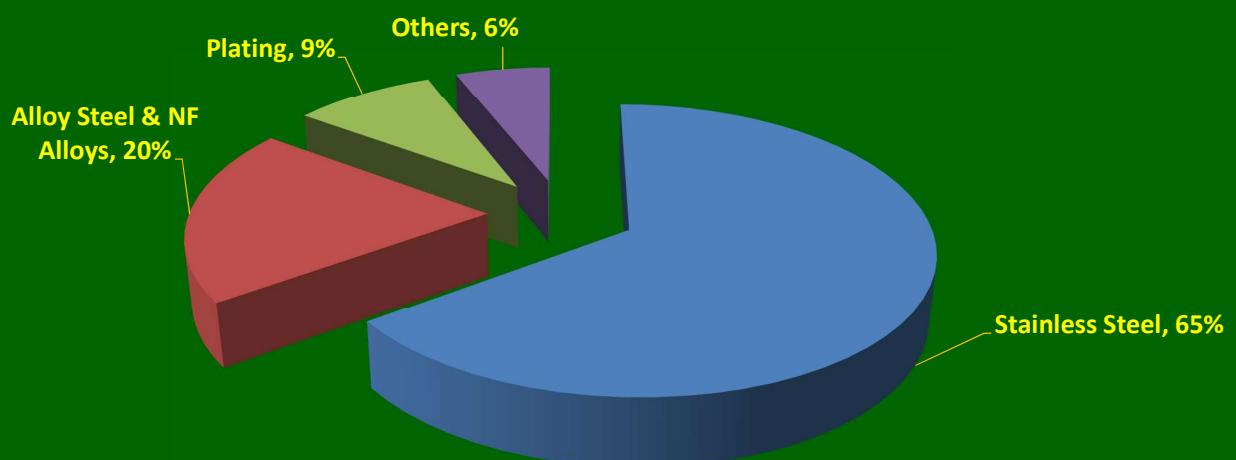
## 4. Nickel in India (in tonnes)

|             | 2020-2021 | 2021-2022 | 2022-2023 |
|-------------|-----------|-----------|-----------|
| Production  | 0         | 0         | 0         |
| Import      | 56,551    | 51,527    | 49,061    |
| Export      | 2,964     | 5,918     | 6,905     |
| Consumption | 53,587    | 45,609    | 42,157    |

(Source: Ministry of Mines; Ministry of Commerce)



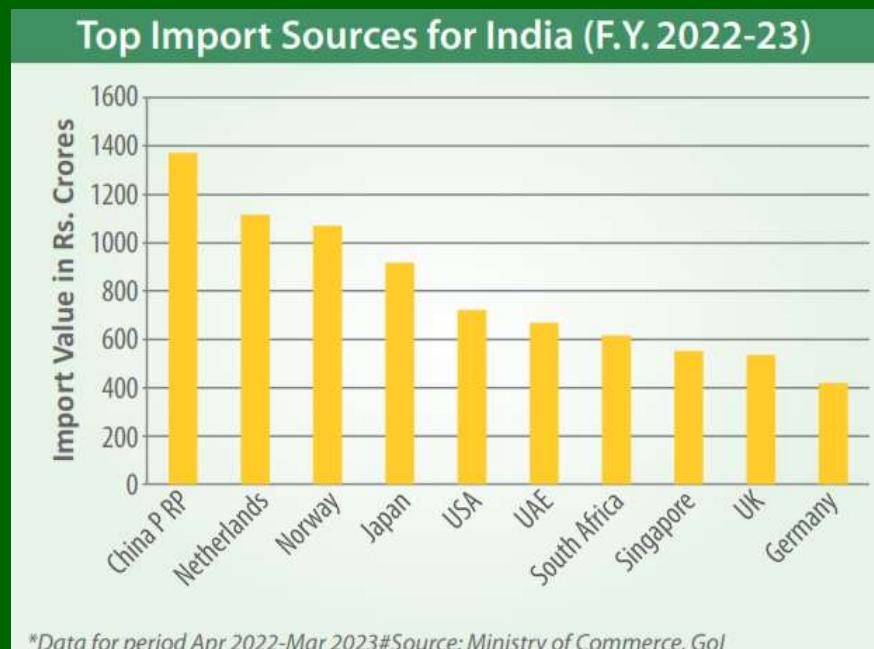
## Sector-wise Nickel Usage in India



(Source: MCX)



## *Imports*



(Source: MCX)

\*Data for period Apr 2022-Mar 2023 #Source: Ministry of Commerce, GoI

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## *Way Forward*

- ***Wastes to continue growing***
- ***Regulations & Safe Practices***
- ***Fine tuning, if reqd.***
- ***Stringent Monitoring & Implementation***
- ***Industry Voluntary Initiative***
- ***Citizens Social Responsibility (CSR)***
- ***GREEN EARTH FOR FUTURE GENERATIONS***

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*Delhi  
Welcomes You!*

**ILZDA LEAD CONCLAVE 2023**

First  
Announcement

Third Edition

**INTERNATIONAL CONFERENCE ON  
LEAD & LEAD BATTERIES  
- ENGINEERING SUSTAINABLE GROWTH**

7 & 8 Dec 2023, New Delhi



*(Glimpses of 2nd Edition New Delhi 2022)*

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Society for Advancement of Electrochemical Science & Technology  
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**THANK YOU**



**INDIA LEAD ZINC DEVELOPMENT ASSOCIATION** 

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